BIONOMICS, DISTRIBUTION
AND CONTROL OF IMPORTANT
PESTS OF PADDY IN UTTAR-
PRADESH By Dr. A.S. Srivastava

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RESEARCH SERIES.

RESEARCH MEMOIR,
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BIONOMICS, DISTRIBUTION AND CONTROL OF IMPORTANT PESTS OF PADDY IN UTTAR PRADESH

by

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INTRODUCTION

Paddy is extensively grown as a staple food crop in practically all the districts of Uttar Pradesh, the total area sown under this crop during 1958-59 in various districts of the State was 1,01,53,501 acres. The acreage of paddy cultivation in various districts of U.-P. is indicated in Plate No. 1. Considering the maturity time, various varieties of paddy are broadly divided into three major groups, viz., early, medium and late, but all the varieties are usually sown and transplanted during the months of June and July when the rains set in. Wherever irrigation facilities are available, paddy nurseries are prepared in the month of May. Early varieties usually mature by the end of August, medium during September-October, while the late varieties mature during November. The paddy crop is attacked by a number of pests, which if allowed to multiply, cause heavy damage to the crop. Some of them appear in epidemic form every year, while others only sporadically.

IMPORTANT PESTS

The following are the important pests of paddy in Uttar Pradesh:—

Common Name	**Scientific Name**
1. Gundhy bug	*Leptocorisa varicornis* Fabr.
2. Stem borer	*Schoenobius incertellus* Wlk.
3. Kharif grasshoppers	*Heiroglyphus banian* Fabr. & *H. nigrorepletus* Bol.
4. Rice leaf hoppers	*Nephotettix apicalis* Mot. & *N. bipunctatus* Fabr.
5, Rice fulgorid	*Nilaparvata lugens* Stâll.

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J, 31; 438:K5.2

	Common Name	Scientific Name
6.	Rice case worn	*Nymphula depunctalis* Guen.
7.	Rice hispa	*Hispa armigera* Oliv.
8.	Armyworms	*Cirphis loreyi* Dup. and C. *unipuncta* Haw.
9.	Swarming caterpillar	*Spodoptera mauritia* Boisd.
10.	Root weevil	*Echinochnemus oryzae* Msll.
11.	Kurmula	*Anomala* varians Oliv.
12.	Eelworms	*Ditylenchus angusta* Butler.

1. **GUNDHY BUG** *(Leptocorisa varicornis* Fabr.)

Leptocorisa varicornis Fabr., belonging to the Family Coreidae the Order Hemiptera is the most destructive pest of paddy in Utta Pradesh. It is commonly known as Gundhy bug, the word having bee derived from the Hindi word *gundhy* meaning strong pungent smel which is emitted by these bugs. Both the adults and the nymph attack the paddy plants by sucking the milky juice from the developin grains on the ears, as a result of which the grains fail to develop shrivel up completely.

The bug starts laying eggs on the leaves of paddy and other alte nate host plants by the end of June when monsoon sets in. Tot period of life history from egg to adult is 20-30 days. Freshly laid eg is oval and yellow in colour, but it soon becomes brown and a minu white spot becomes visible on the micropylar end. One to fifteen eggs a usually laid in masses on leaves in a linear fashion, sometimes 2 to lines of egg masses are observed side by side. The incubation period eggs is 6-8 days. Newly hatched nymph is green, which deepens brownish shade as it grows. Each moult of the nymph after the secon stage is followed by the change in colour and distinct development wings. The nymphal stage lasts from 14-25 days. The adult is

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PLATE I

MAP OF UTTAR PRADESH (INDIA) SHOWING DISTRICT WISE ACREAGE OF PADDY DURING 1958

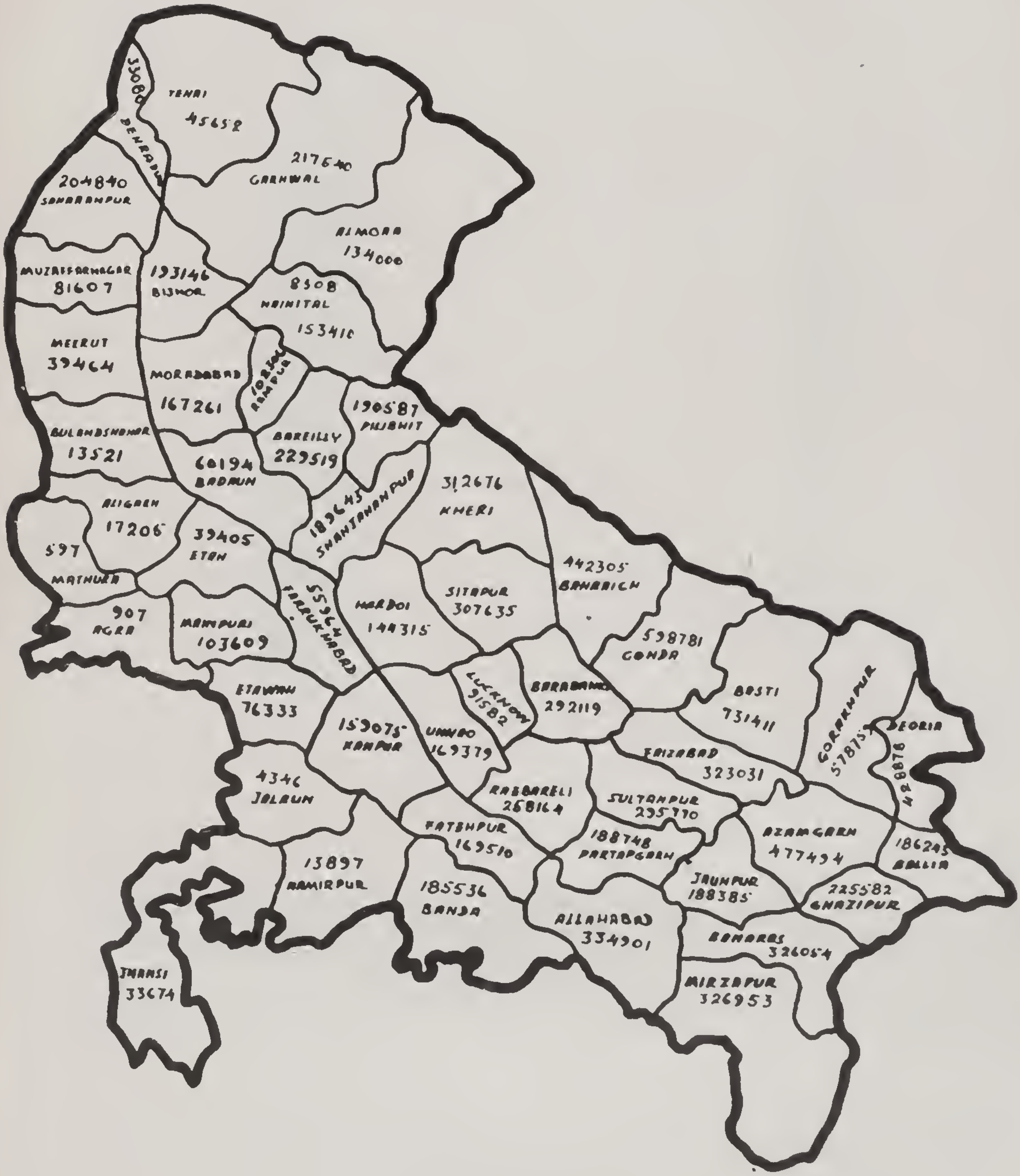
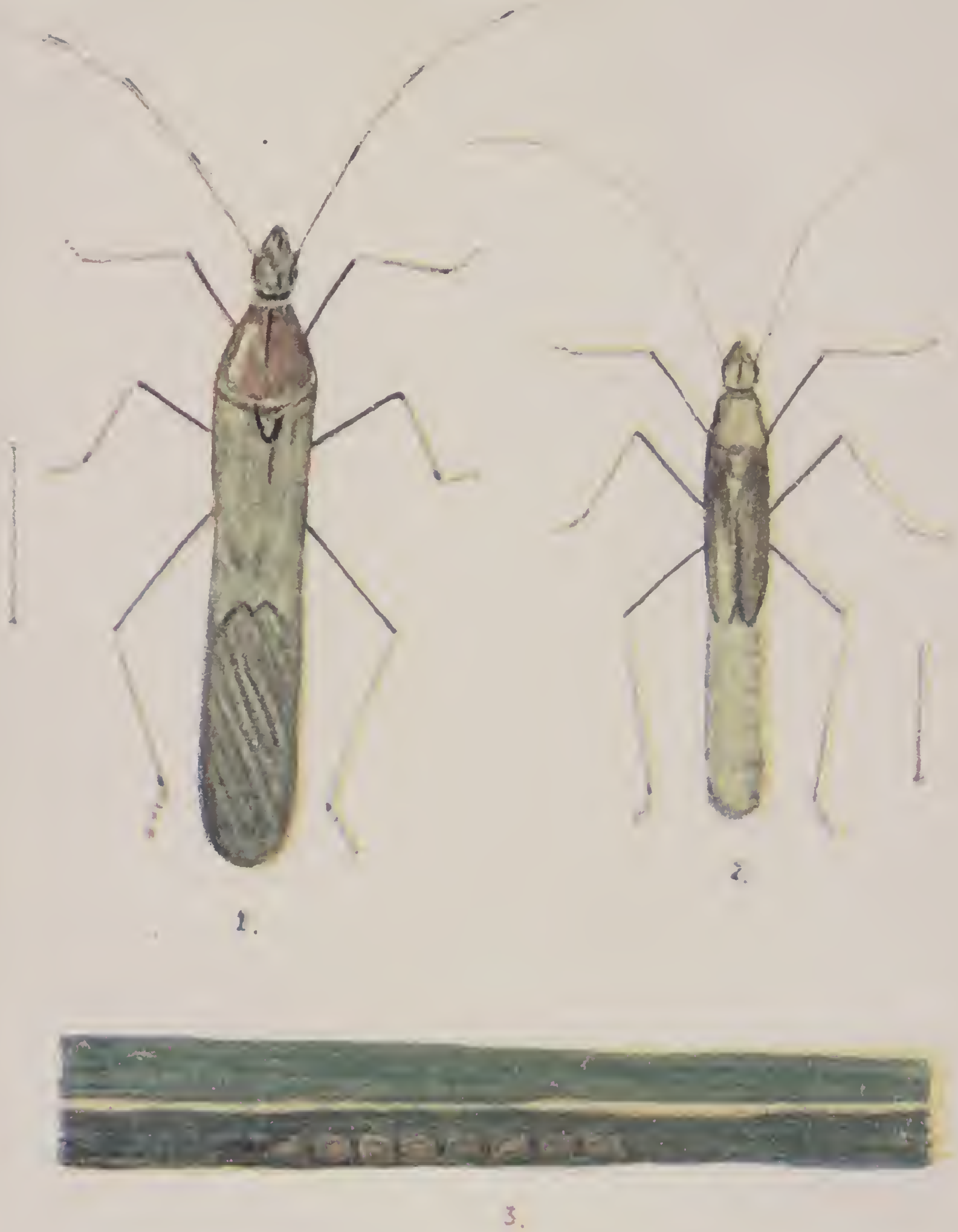

33080
DEHRADUN
TEHRI
45658
217640
GARHWAL
ALMORA
134000
204840
SAHARANPUR
MUZAFFARNAGAR
81607
193146
BIJNOR
8308
NAINITAL
153410
MEERUT
39464
MORADABAD
167261
108346
RAMPUR
190587
PILIBHIT
BULANDSHAHR
13521
BAREILLY
229519
60194
BADAUN
183645
SHAHJAHANPUR
312676
KHERI
ALIGARH
17206
597
MATHURA
39405
ETAH
55964
FARRUKHABAD
442305
BAHRAICH
907
AGRA
MAINPURI
103609
HARDOI
144315
SITAPUR
307635
598781
GONDA
LUCKNOW
91582
BARABANKI
292119
BASTI
731411
GORAKHPUR
578755
DEORIA
428878
ETAWAH
76333
159075
KANPUR
UNNAO
169379
FAIZABAD
323031
4346
JALAUN
RAEBARELI
258164
SULTANPUR
295770
AZAMGARH
477494
186245
BALLIA
FATEHPUR
169510
188748
PARTAPGARH
13897
HAMIRPUR
185536
BANDA
JAUNPUR
188385
225582
GHAZIPUR
ALLAHABAD
334901
BANARAS
326054
MIRZAPUR
326953
JHANSI
33674

PLATE II

LEPTOCORISA VARICORNIS FABR.



1. **Adult**
2. **Nymph**
3. **Egg mass**

greenish brown colour about 14 mm long and 3 mm wide with long slender legs (Plate No. II). The longevity of an adult insect varies from 45 to 60 days depending upon the climatic factors.

The insect over-winters during December to March and passes summer months during April to June in an adult stage on grasses and other plants and is found only as scattered individuals in very small numbers. Besides paddy crop the insect has been observed to feed on the following plants, some of which have already been described in entomological literature. Specimens of these plants were sent to Botanical Garden, Shibpur, Calcutta and National Botanical Gardens, Lucknow for identification.

	Scientific Name	**Local Name**
1.	*Andropogon annulatus* Forsk.	*Jhankara*
2.	**Andropogon sorghum*	*Juar*
3.	*Apluda* sp.	*Chhari*
4.	*Cyperus iria* Lin.	*Moths*
5.	*Cyperus rotundus* Lin.	*Moths*
6.	*Digitaria bifasculata* (Trinn) He.	*Siuri*
7.	*Digitaria marginata* Lin.	*Sehri*
8.	**Elusine coracona*	*Madua or medwari*
9.	*Echinochloa crusgali* Beauv.	*Solni*
10.	*Echinochloa colonum* Lin.	*Sewain*
11.	*Eragrostis pilosa* Beauv.	*Jhusa*
12.	*Frimbristylis miliacea* Vahl.	
13.	*Ischaemum rugosum* Salisb.	*Dhanua*
14.	*Panicum colonum*	*Jangli saman*
15.	**Panicum frumentaceum*	*Saman*

Scientific Name	**Local Name**
16. *Paspalidium flavidum* A. camus,	
17. **Paspalum sorobiculatum* Lin.	*Kodon kudarli*
18. **Pennisetum typhoideum*	*Bajra*
19. *Phacelurus speciosus* (sleud) C. E. Hubbard.	
20. **Sacharum officinarium*	*Ganna*
21. *Setaria glauca* Beauv.	*Banra banri*
22. **Zea mays*	*Makka*

The bugs first appear on the weeds, which serve as alternate hos and food plants, and which are generally found growing along with th paddy crop and also in the uncultivated bordering areas. The insec migrates from these secondary hosts to the paddy crop when the latte comes in flowering. In case early rains set in during May and June these weeds grow earlier and provide ready source for the multiplicatio and development of the bugs. Clean cultivation is important with view to minimising the attack of *gundhy* bug on the paddy crop so tha there may not be prolific growth of weeds in paddy fields. A rapid ris in the infestation of bugs on these food plants is a prelude to a impending danger of an outbreak of *gundhy* epidemic.

Natural enemies of this bug found are an egg parasite and tw predators. The two predators are a beetle, *Cicindela sexpunctata* Fabr. and a robber fly, *Ommatius* sp., both of which destroy the nymphs as well as adults. In nature both the parasite and predators are not able to keep the bug in check. Observations were made on the phototropic response of the bugs and it was found that these bugs are not attracted in appre-

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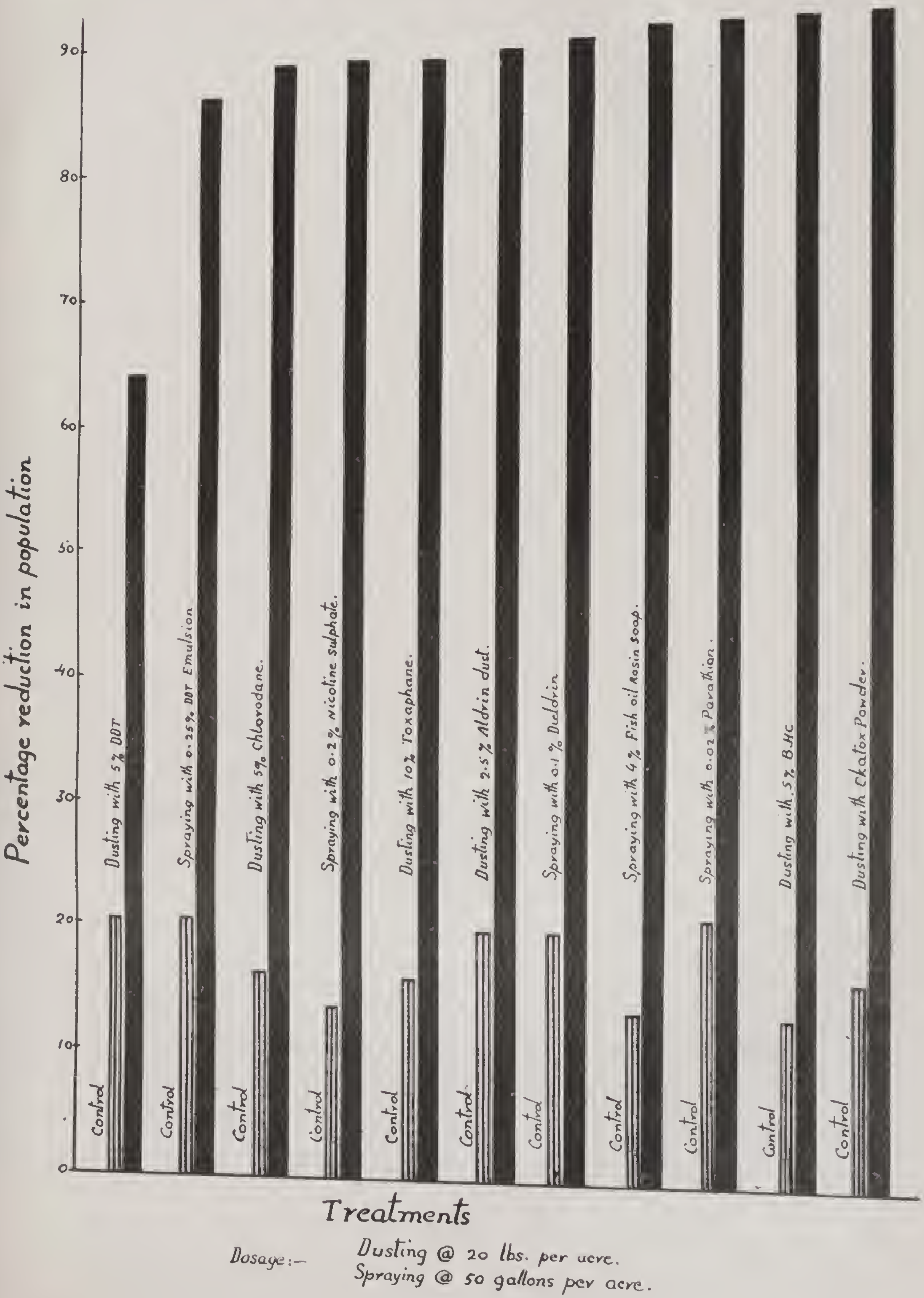
*These are cultivated plants.

Note:—The plants mentioned at 2, 5, 9, 16, 18, 21 and 22 have als been observed as alternate host plants of *L. varicornis.*

PLATE III

INSECTICIDAL TRIALS AGAINST GUNDHY BUG OF PADDY, LEPTOCORISA VARICORNIS FABR.; CONDUCTED DURING THE LAST FEW YEARS



ciable numbers towards an incandescent light and this phenomenon cannot, therefore, be usefully employed by way of using light traps in successfully eliminating the pest. In a preliminary experiments to determine the phototropic response of different insect pests to milky, blue, green and red colours of light at different hours at night conducted at Kanpur (unpublished data), it has been observed that the adults of *L. varicornis*, are attracted to milky light mostly from 19.00 to 20.00 hours during August to October.

A number of modern synthetic insecticides which included DDT, BHC, Parathion, Toxaphene, Chlordane, Aldrin and Dieldrin and also Pyrodust, fish oil rosin soap and a new formulation containing nicotine sulphate with sesame oil as synergist were tested, in various formulations, strengths and dosages against this pest, as a result of which dusting with 5% BHC, was found to be most economical method of its control. This method is in widespread use in Uttar Pradesh for the last several years. The results of trials conducted against this pest during the last several years are represented through a barograph (Plate No. III

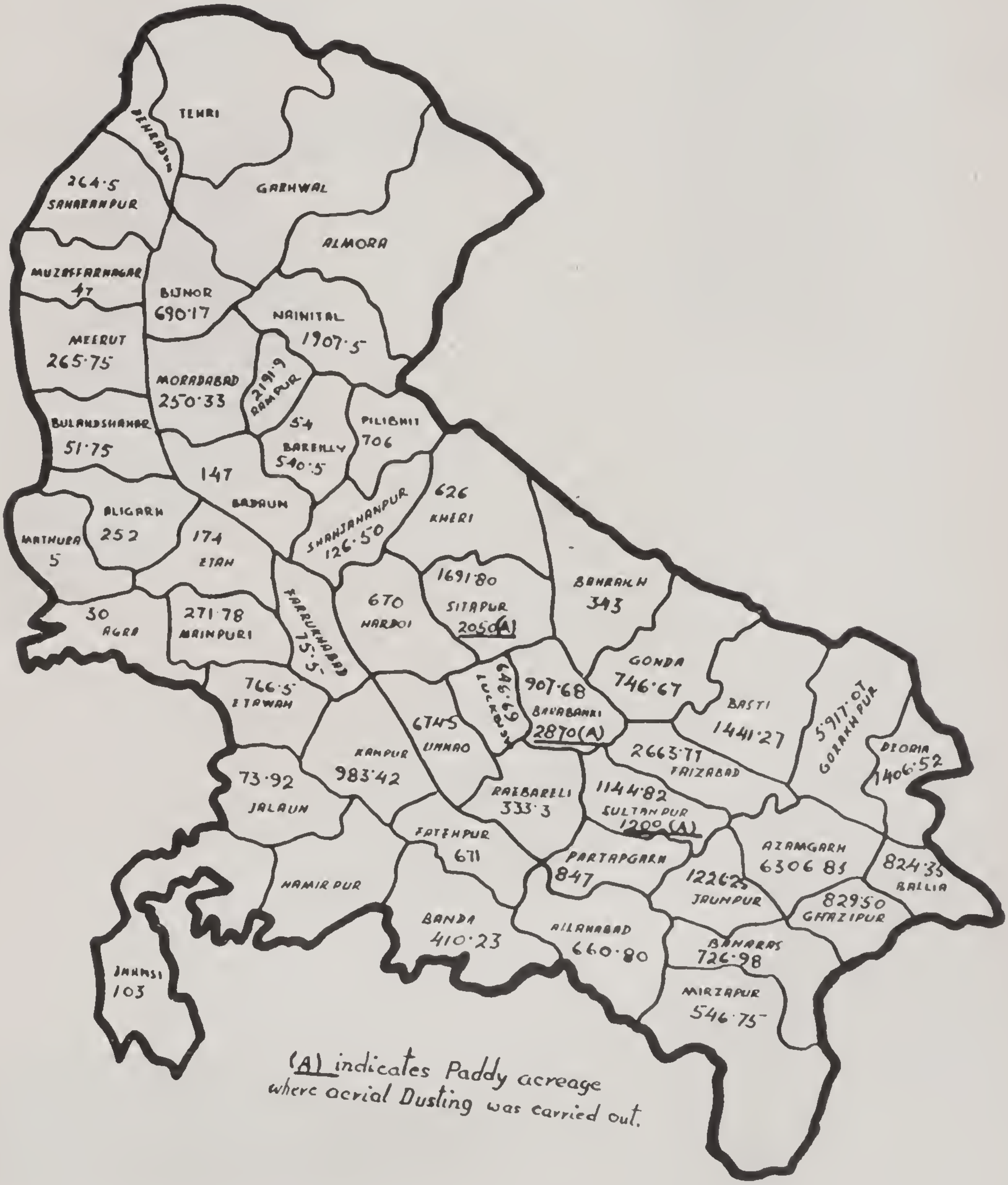
During 1958 there was a widesprad attack of gundhy bug on paddy crop. Control operations against this pest were undertaken in 48,416.8 acres of paddy fields in practically all the districts of Uttar Pradesh. The district-wise total average of paddy crop treated for the pest has been shown in Plate No. IV. The dusting generally was carried out by rotary hand dusting machines. 6370.0 acres in four districts of the State namely Sitapur, Sultanpur, Lakhimpur-Kheri and Barabanki were dusted by a Beaver type aeroplane provided by the Directorate of Plant Protection, Quarantine and Storage, Government of India. Experience has shown that hand dusting has proved more effective in comparision with the aerial dusting under local conditions. The application of insecticidal dust in infested areas with hand dusting machines can be better regulated than in the case of aerial dusting, in latter case there is a considerable drifting of the dust depending upon the wind direction to other crop fields, fallow and grassy lands. Besides this drawback, the borders of the treated fields do not get uniform distribution of insecticide through aerial dusting with the result that the bugs survive and continue to cause damage to the crop in these areas. Further it has been observed that the cattle normally do not graze in the pastures or feed on the fodder and grasses collected from the areas which are inadvertantly dusted during the aerial dusting of paddy fields. In Uttar Pradesh, dusting through an aeroplane may not also be successful because of the presence of mechanical obstacles largely in the form of tall trees; patches of forests and in some cases poles and wires, and also the absence of smaller aerodromes near the operational sites for refueling, landing and replenishing the stock of insecticides. These difficulties can, however, be minimised to a considerable extent if a helicopter is employed for aerial dusting in place of an aeroplane. The helicopter can take off vertically and hover only a few feet above the infested crop with the result that the insecticide can be applied more accurately on the target. Further the helicopter has also the advantage of being easily loaded on a truck and taken close to the point of operation.

2. **STEMBORER** (*Schoenobius incertellus* Wlk).

Schoenobius incertellus Wlk. belonging to the Family Pyralidae of the Order Lepidoptera is the main stem borer of paddy- This, however, is not a serious pest of paddy in Uttar Pradesh. In general the damage caused to different varieties of crop by the stem borer varies from 5% to 20%. Late varieties of paddy are liable to be more severely attacked than the early maturing ones, because the pest gets a chance to multiply in good numbers by the time late varieties mature. The external symptom of the presence of borer in the young plant is the gradual fading and the ultimate death of the central shoot on account of the consumption of the internal tissue by the caterpillar. If plants are attacked during the flowering stage, the earheads dry up without

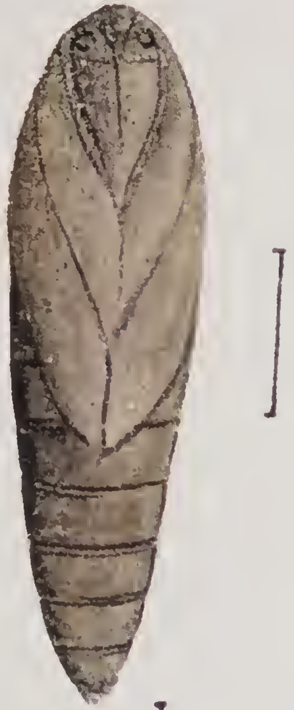
PLATE IV

MAP OF UTTAR PRADESH (INDIA) SHOWING DISTRICT WISE ACREAGE OF PADDY TREATED AGAINST *LEPTOCORISA VARICORNIS* FABR. DURING 1958


TEHRI
DEHRADUN
GARHWAL
264·5
SAHARANPUR
ALMORA
MUZAFFARNAGAR
47
BIJNOR
690·17
NAINITAL
1907·5
MEERUT
265·75
MORADABAD
250·33
2191·9
RAMPUR
5·4
BAREILLY
540·5
PILIBHIT
706
BULANDSHAHAR
51·75
147
BADAUN
626
KHERI
SHAHJAHANPUR
126·50
ALIGARH
252
MATHURA
5
174
ETAH
1691·80
SITAPUR
2050(A)
BAHRAICH
343
30
AGRA
271·78
MAINPURI
FARRUKHABAD
75·5
670
HARDOI
GONDA
746·67
646·69
LUCKNOW
907·68
BARABANKI
2870(A)
BASTI
1441·27
5917·07
GORAKHPUR
DEORIA
1406·52
766·5
ETAWAH
6745
UNNAO
2663·77
FAIZABAD
KANPUR
983·42
73·92
JALAUN
RAIBARELI
333·3
1144·82
SULTANPUR
1200(A)
FATEHPUR
671
PARTAPGARH
847
AZAMGARH
6306·81
824·35
BALLIA
1226·25
JAUNPUR
829·50
GHAZIPUR
HAMIRPUR
BANDA
410·23
ALLAHABAD
660·80
BANARAS
726·98
JHANSI
103
MIRZAPUR
546·75

(A) indicates Paddy acreage where aerial Dusting was carried out.

SCHOENOBIUS INCERTELLUS WLK



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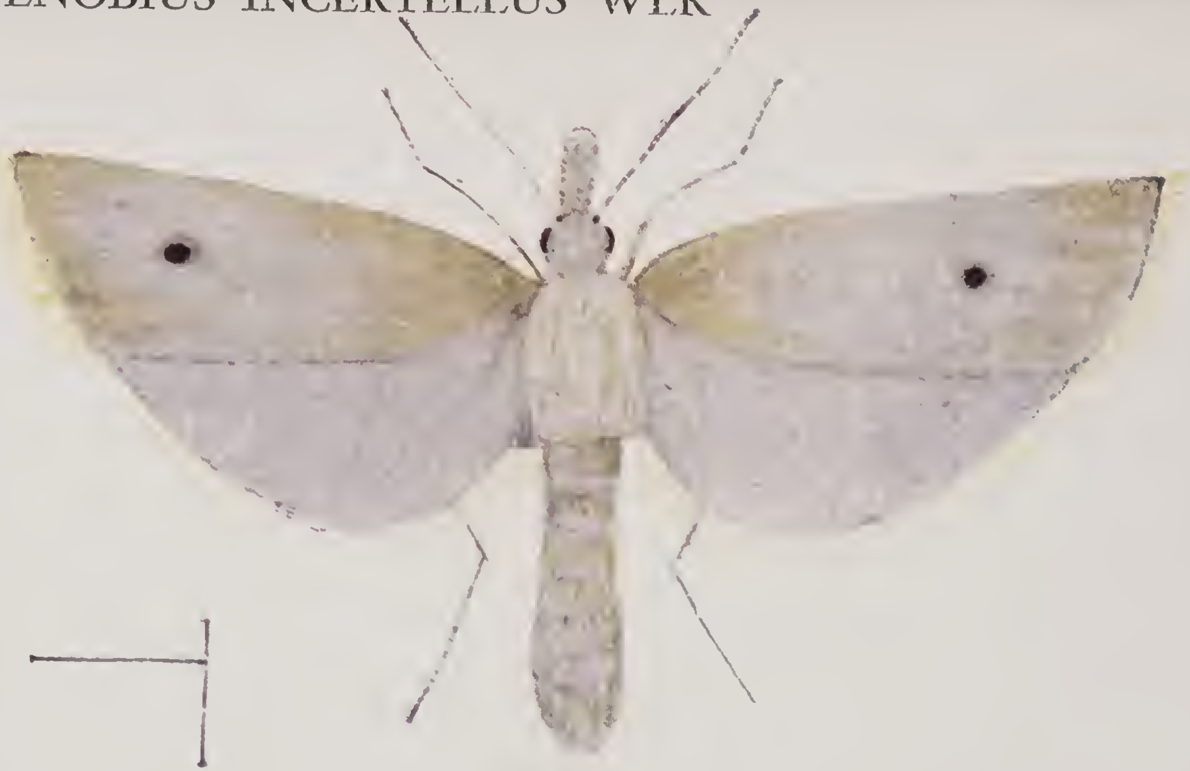

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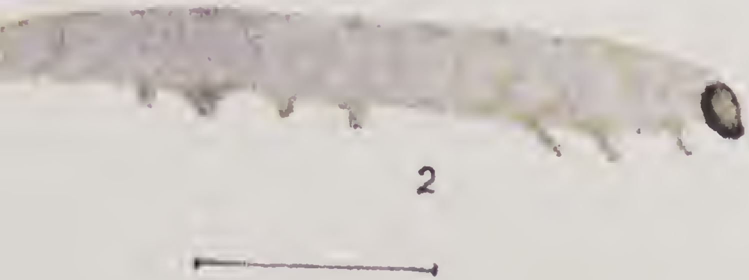

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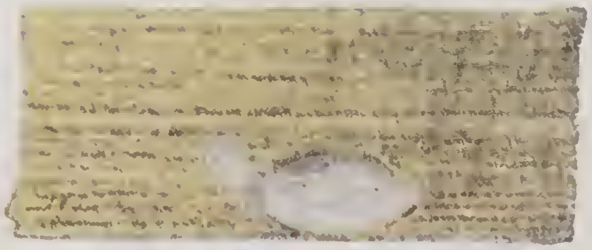


4.

1. Adult
2. Caterpillar
3. Pupa

the development of grains, causing white earheads which can easily be spotted out in the fields.

The moths of *S. incertellus* usually rest during the day, fly and mate after dusk. The female lays eggs in small masses covered with a layer of thin hairs mostly on the underside of the tender leaves. The freshly laid egg is oval, flattend and dirty white in colour. Later it becomes darker and darker and finally turns brown at the time of hatching. The incubation period is 6-8 days. The tiny young caterpillar feeds on the tender leaf tissue for about a couple of days and later on coming in contact with the stem, it bores and enters inside. It goes on feeding the internal tissue descending down towards the roots. It has been observed sometimes that the larva after destroying one stem may migrate to a fresh one. The larval period lasts for 20-30 days. The full fed caterpillar is pale yellowish in colour and measures about one inch in length. It pupates inside the tunnel of the stem for 9-12 days and emerges out as a moth through a hole previously prepared by the caterpillar for the purpose (Plate No. V).

A number of modern synthetic insecticides including DDT, BHC, Parathion, Aldrin, Dieldrin, Endrin and Diazinon have been tested in various concentrations and dosages during the past several years with a view to evolving a cheap and effective method of control. Out of various treatments tried during 1958, spraying the crop with a mixture 0.05% Diazinon + 0.75 lbs. actual Endrin per acre four times, first at the nursery stage before transplanting in the 1st week of August and later after 4 weeks, 2 weeks and 3 weeks respectively, during the season, proved most efficacious in reducing the infestation of stem borers and the results were found to be statistically significant. The details of various treatments tried during 1958 are represented in a barograph. (Plate No. VI). The cost of this treatment may not prove economical in case of mild attack, but it may prove beneficial when the crop is to be saved from severe infestation. Further field scale trials to minimise the number of applications for ultimately achieving an economical methods of control are in progress.

3. **KHARIF GRASSHOPPERS** (*Heiroglyphus banian* Fabr. and *H. nigrorepletus* Bol.)

Two species of grass-hoppers viz., *Heiroglyphus banian* Fabr. and *H. nigrorepletus* Bol. belonging to the Family Acridiidae of the Order Orthoptera have been predominantly found involved in damaging the paddy crop and also other *Kharif* crops like sugarcane, maize, *Juar* etc., and do considerable damage to them. Outbreaks of severe epidemics of these pests in the State are not infrequent.

The eggs of these grasshoppers lie dormant in the infested fields till about June when after the first showers of the monsoon rains, they hatch and the resulting nymphs first browse on grasses and later as they grow; migrate to cultivated crops which they damage severely. These nymphs turn into adult grasshoppers by the end of September, which take sometime to mature, mate and they die after laying the eggs in the soil in October (Plate No. VII).

A number of insecticides were tested against this pest and as a result of these trials an economic and effective method of their control has been found out. It consists of dusting the crop with 5% BHC dust and this method is being widely adopted in this State.

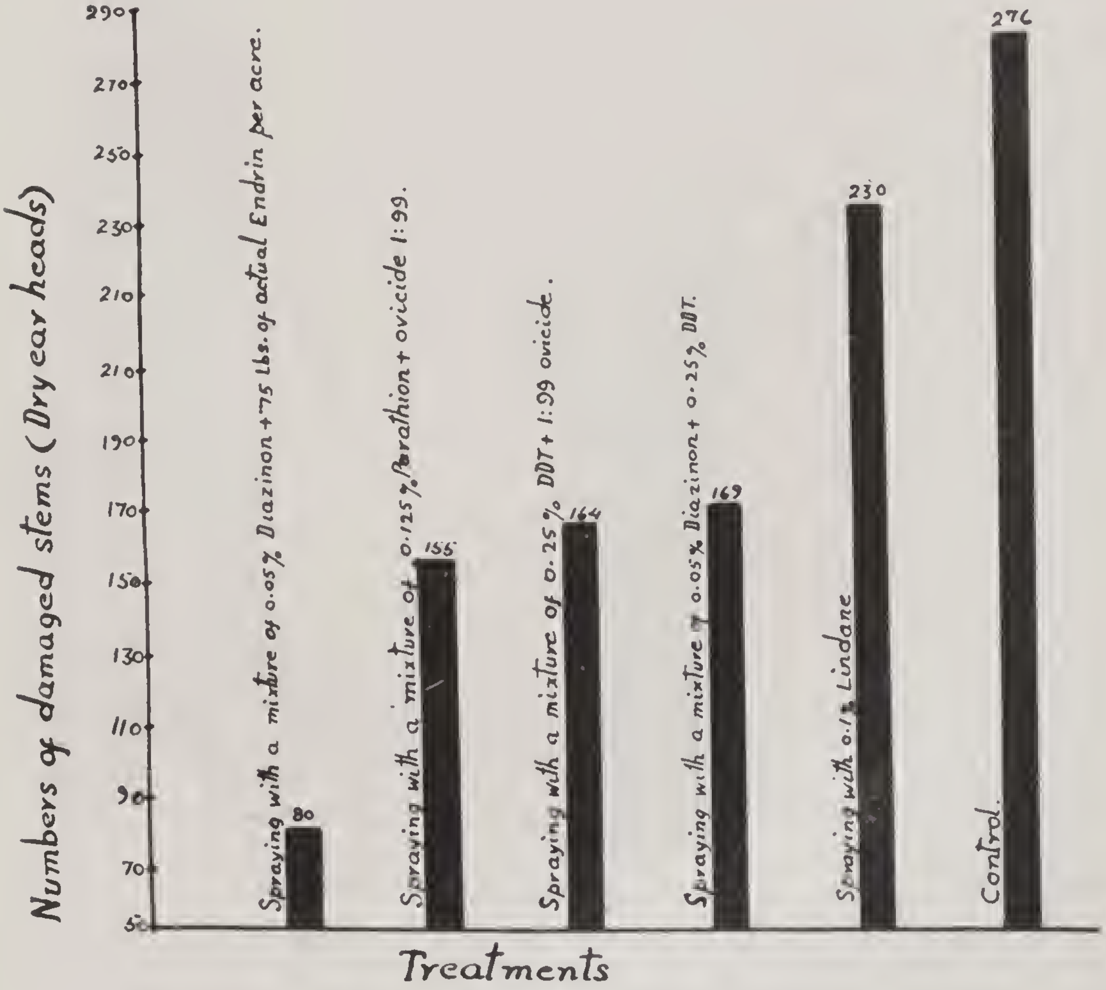
4. **RICE LEAF HOPPERS** (*Nephotettix apicalis* Mot. and *N. bipunctatus* Fabr.)

Two species viz., *Nephotettix apicalis* Mot. and *N. bipunctatus* Fabr., belonging to the Family Jassidae of the Order Hemiptera occur sporadically and cause damage to the crop by sucking the sap from the leaves.

The bugs are attracted in large numbers towards incandescent light. Dusting the crop with 5% BHC dust @ 20 lbs. per acre has proved effective in controlling these insects.

PLATE VI

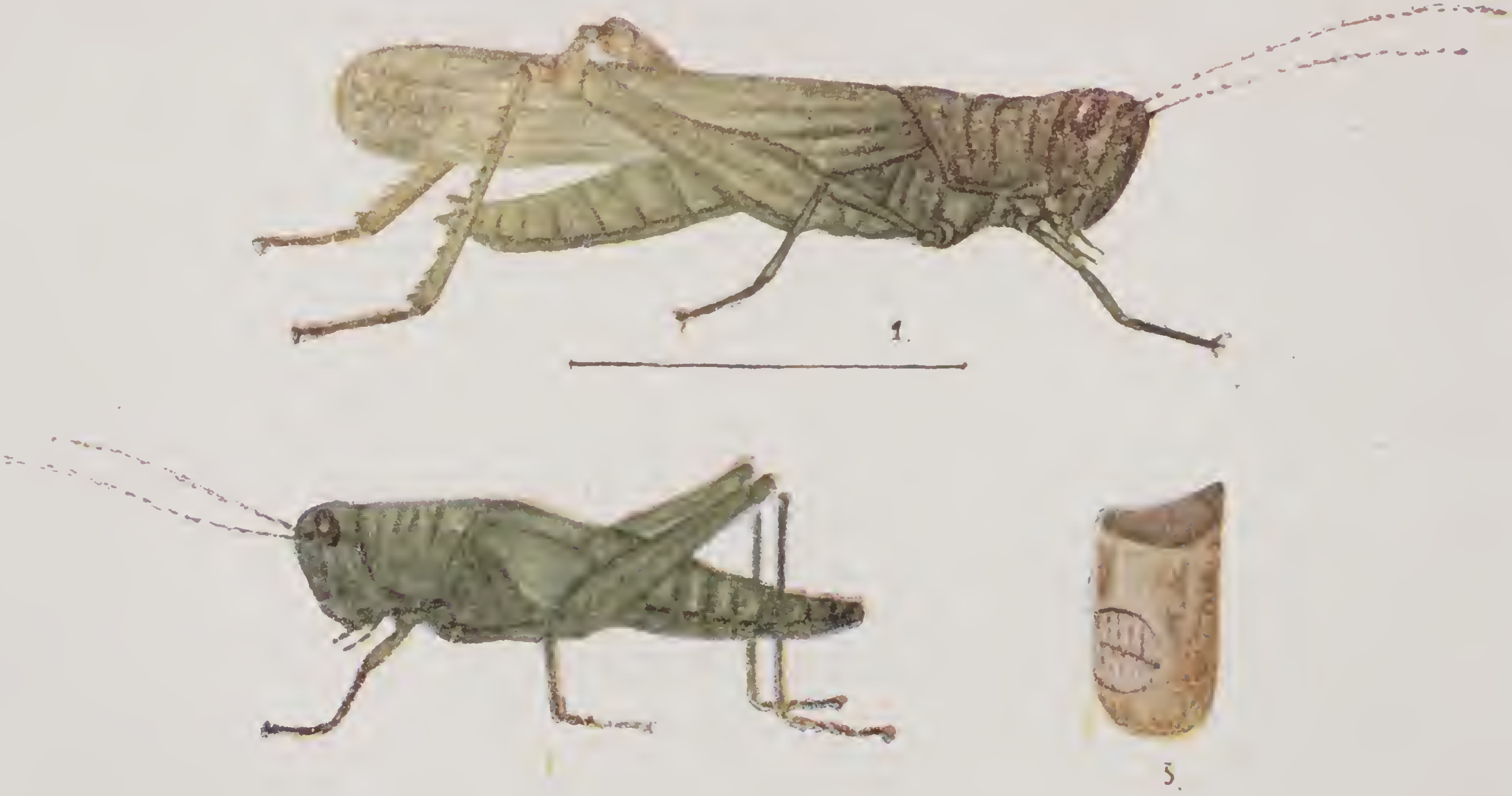
INSECTICIDAL TRIAL AGAINST STEM BORER OF PADDY CONDUCTED DURING 1958



Dosage @50 gallons per acre.

PLATE VII

HEIROGLYPHUS BANIAN FABR.



1. Adult
2. Nymph
3. Eggs in a pouch

5. **RICE FULGORID** *(Nilaparvata lugens* Ståll.)

The rice fulgorid *Nilaparvata lugens* Stall., belonging to the Family Fulgoridae of the Order Hemiptera, is also a sporadic pest and causes severe damage to the paddy crop. Its occurrence has generally been reported from eastern districts of the State. The pest may occur singly or alongwith the leaf hoppers *Nephotettix* spp. described earlier. It can also be controlled effectively by dusting the crop with 5% BHC @ 20 lbs. per acre.

6. **RICE CASEWORM** *(Nymphula depunctalis* Guen.)

The rice caseworm *Nymphula depunctalis* Guen. belongs to the Family Pyralidae of the Order Lepidoptera. It normally occurs in low-land areas which remain inundated and has been reported from various districts of Uttar Pradesh. The adult is a small moth with white specked wings. It lays eggs on paddy leaves and the larvae which are thin and covered with slender small hairs, cut paddy leaves, roll the pieces into cases in which they shelter themselves and float on the water surface. The pest has been successfully controlled by dusting the infested crop with 10% BHC dust @ 20 lbs. per acre (Plate No. VIII).

7. **RICE HISPA** *(Hispa armigera* Oliv.)

The rice hispa, *Hispa armigera* Oliv. belongs to the Family Chrysomelidae of the Order Coleoptera. The adult is a small black insect with bristles on the body. The grub mines the leaves of paddy and in severe infestation the crop completely fails. Few years back there was an outbreak of rice hispa at Government Agricultural Farm, Unnao. Insecticidal trials of control measures were conducted at that place and it was concluded that the pest can be effectively controlled by spraying the crop with 0.5% DDT suspension @ 50 gallons per acre and dusting with 5% BHC @ 20 lbs. per acre. (Plate No. IX).

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* *Dicladispa (Hispa) armigera* Oliver.

8. **ARMYWORMS** (*Cirphis loreyi* Dup. and *C. unipuncta* Haw.)

Two species, namely, *Cirphis loreyi* Dup. and *C. unipuncta* belonging to the Family Noctuidae of the Order Lepidoptera occur on paddy crop. It has been observed that the pest is more serious on wheat and barley than on paddy from which they migrate to Rabi cereals when the plants are in seedling stage. Sometimes the entire wheat and barley crops are resown as a result of severe infestation The pest on paddy can be effectively controlled with 5% DDT or Aldrin dusts and 10% BHC @ 20 lbs. per acre. (Plate No. X).

9. **SWARMING CATERPILLARS** (*Spodotera mauritia* Boisd.)

Spodotera mauritia Boisd. belonging to the Family Noctuidae of the Order Lepidoptera is of very sporadic occurrence but causes considerable damage to the paddy crop in case not timely controlled. During early Kharif, the pest appears on maize and *juar* and from these crops it migrates to paddy. It can be controlled satisfactorily by dusting the crop with 5% BHC @ 20 lbs. per acre. (Plate No. XI).

10. **PADDY ROOT WEEVIL** (*Echinochemus oryzae* Marshall.)

The insect paddy root weevil, *Echinochemus oryzae* Marshall belongs to the Family Curculionidae of the order Coleoptera. The small white apodus larvae of this insect has been found to do damage to the paddy roots in certain areas of U. P. with the result that the crop is destroyed in patches. A preliminary trial of control measures against this pest was projected in which treatments of spraying the crop with 0.05% Diazinon @ 50 gallons per acre and 1.5 lbs. of actual endrin emulsifiable concentrate, per acre were tried. Any of these treatments could not prove useful in killing the pest and a general reduction of grubs was noticed even in untreated plots after a few days.

11. **KURMULA** (*Anomala varians* Oliv.)

The insect kurmula, *Anomala varians* Oliv. belongs to the Family

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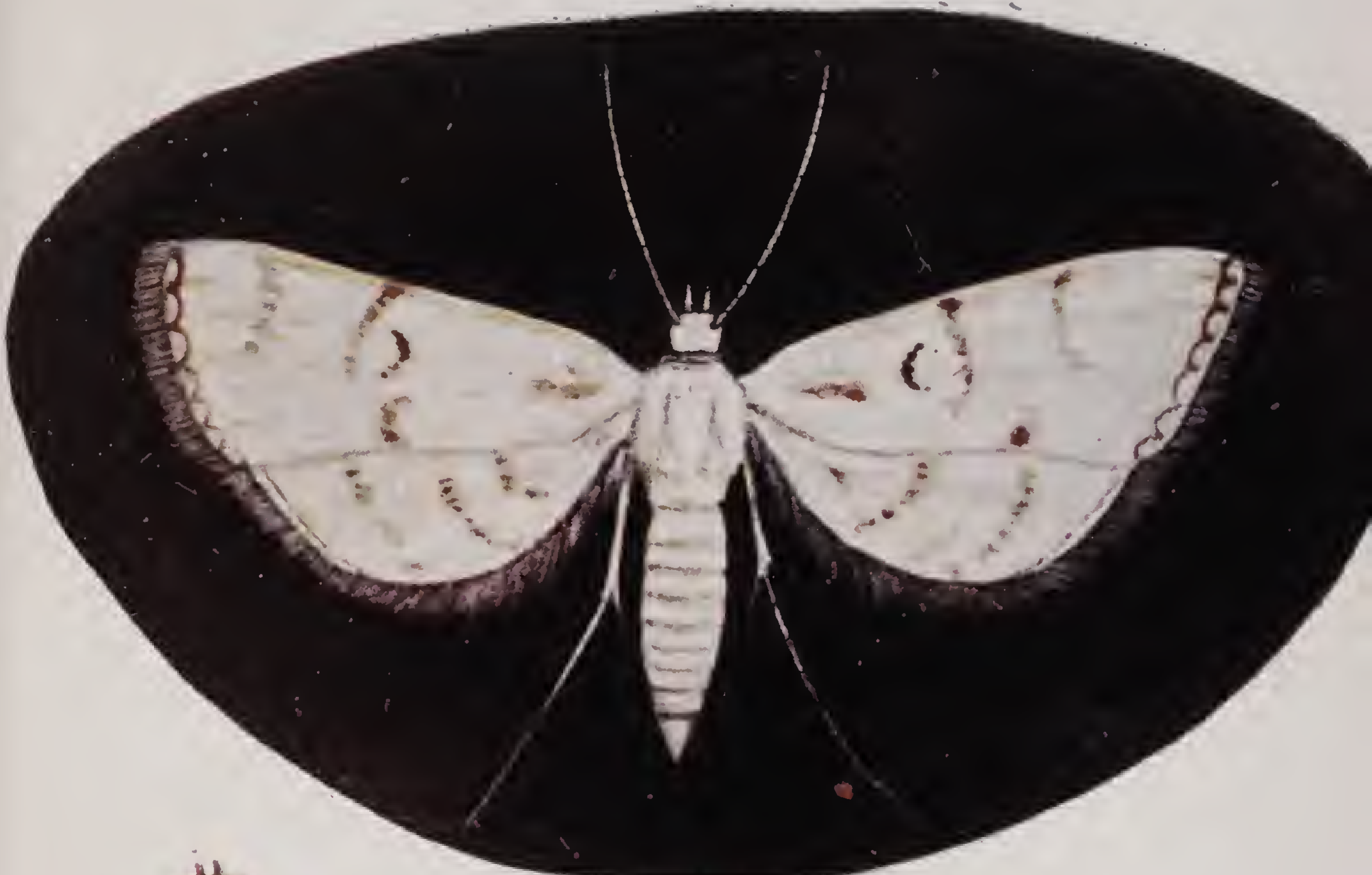
* *Leucania (Cirphis) unipuncta* Haworth.

NYMPHULA DEPUNCTALIS GUEN



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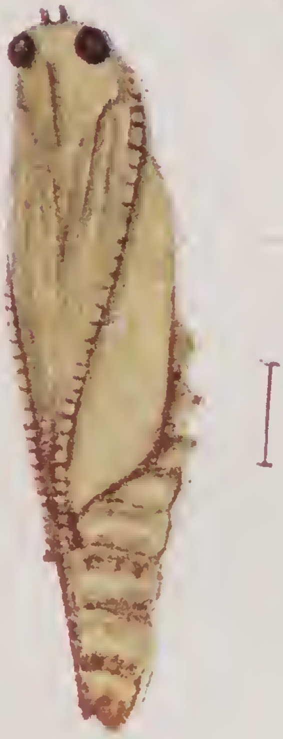

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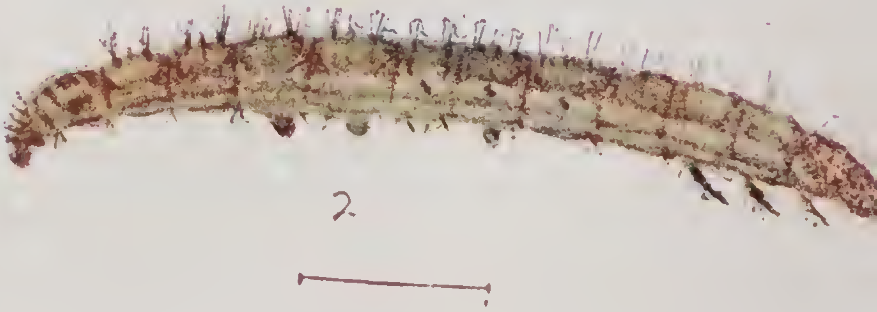
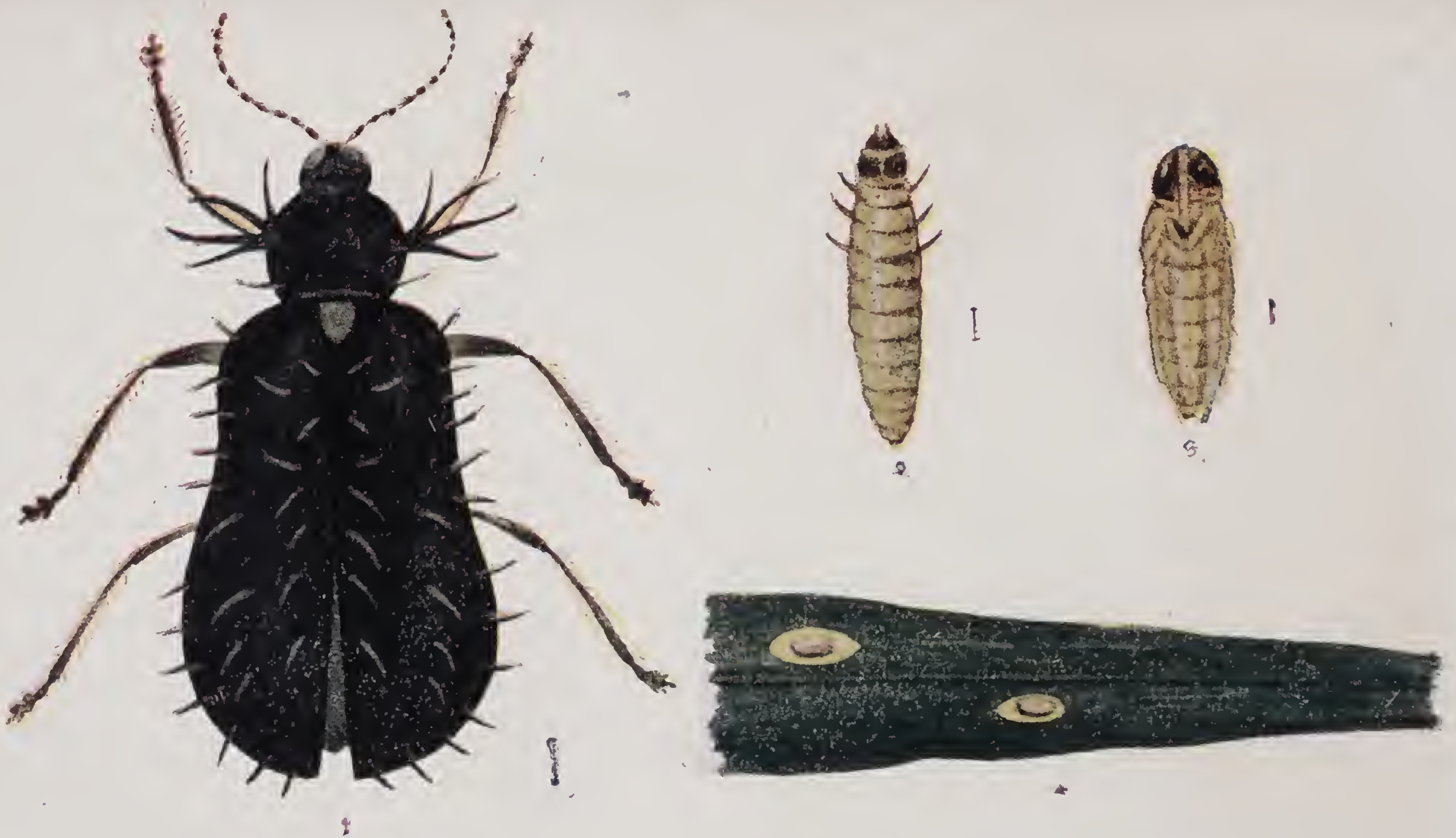


2

1. Adult
2. Larva
3. Pupa

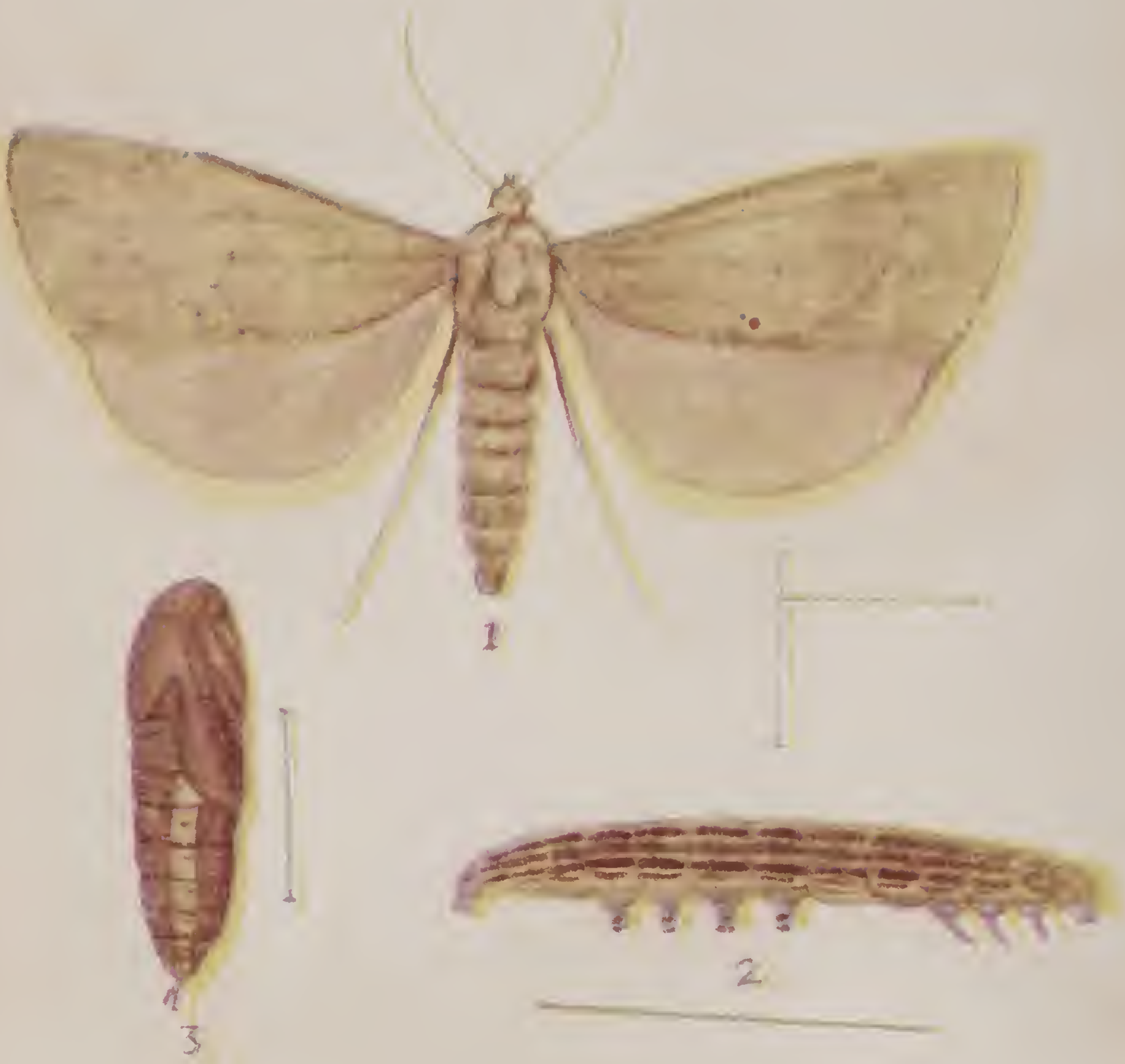
HISPA ARMIGERA OLIV



1. Adult
2. Grub
3. Pupa
4. Damaged leaf with harbouring immature stages

PLATE 2

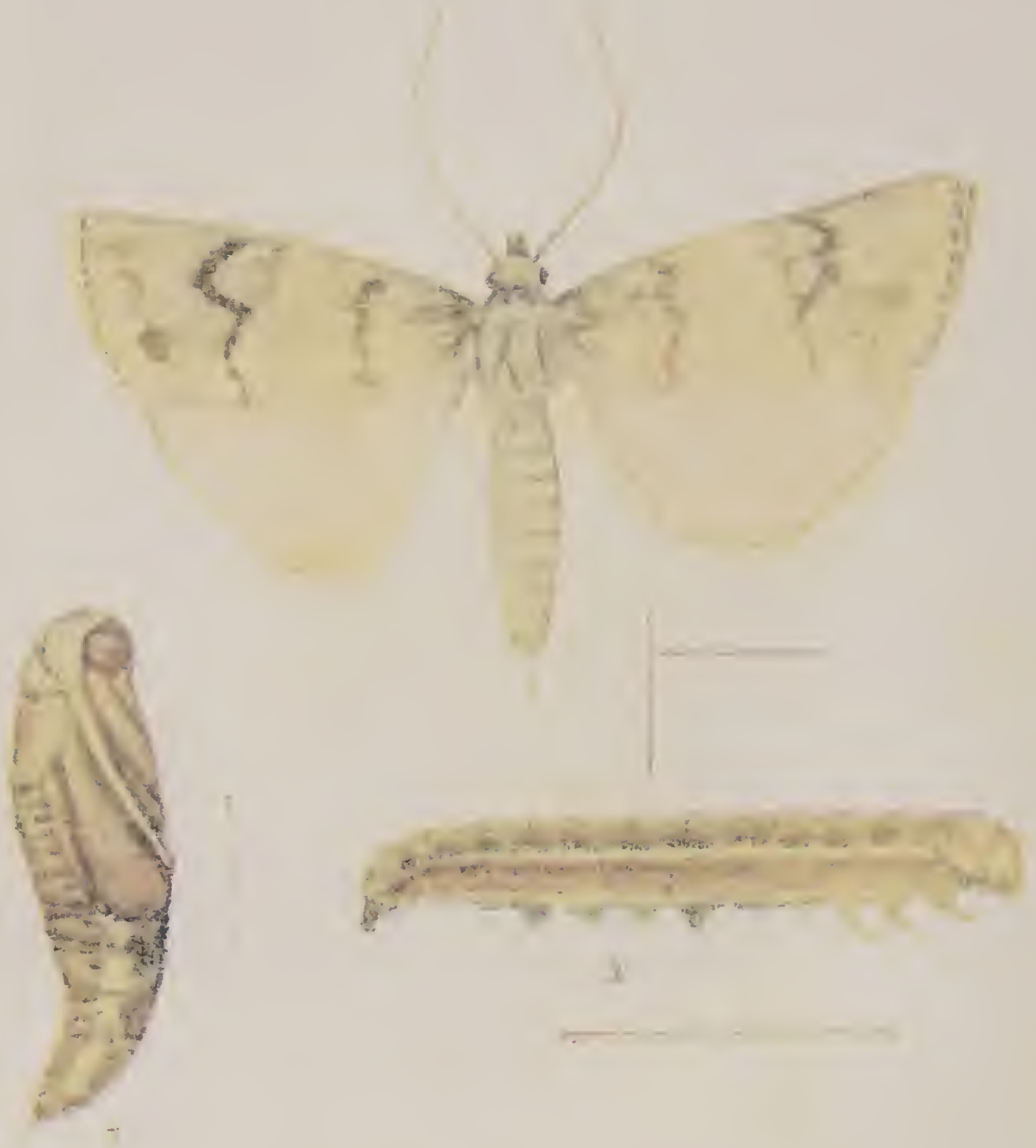
CIRPHIS UNIPUNCTA HAW.



1. Adult
2. Larva
3. Pupa

PLATE XI

SPODOPTERA MAURITIA BOISD



1. Adult
2. Larva
3. Pupa

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Centonidae of Order Coleoptera. The larvae of this insect along with some other insects of this family cut the roots of paddy plants and the plants are killed ultimately. This is a problem of hill districts in U. P. The raking the soil with 10% BHC or 5% aldrin dusts appears promising for the control of this pest. (Plate No. XII.)

12. **EELWORMS** (*Ditylenchus angusta* Butler.)

This nematode sometimes occurs as a serious pest of paddy crop. The leaves of paddy plant turn yellow and ultimately the plants dry up. Insecticidal trial to control the pest was conducted during 1954. 0.05% Diazinon emulsion sprayed on the soil with the paddy plants was found effective, whereas, BHC and DDT proved ineffective in killing the nematodes. (Srivastava, A. S. and Saxena, H. P.–Proc. 43rd. Sess. Ind. Sc. Congress Assoc., Pt., III, p. 286, 1956)

MINOR PESTS

The minor pests, which singly do not cause any economic loss to the paddy crop in Uttar Pradesh, are the rice butterfly, *Melanitis ismene* Cram., leaf binding caterpillar, *Paranara mathias* Fabr., grasshoppers, *Oxya velox* Fabr., *Acrida* sp. and *Chrotogonus* sp., borers, *Sesamia inferens* Wlk., *Chilo zonellus* Swinhoe and *Ancylolomia* sp., bug, *Leptocorisa acuta* Thumb., and flower eating beetle, *Canthris* sp.

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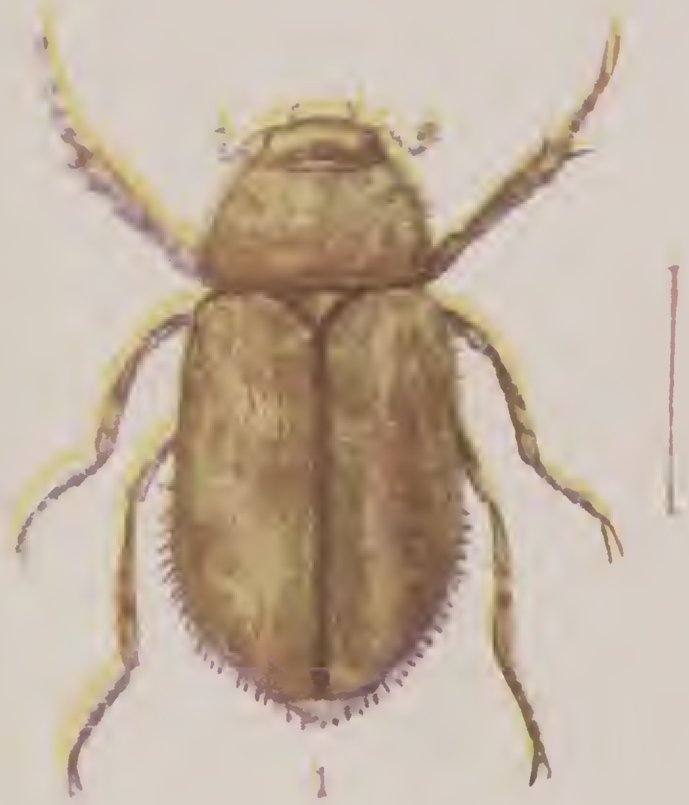

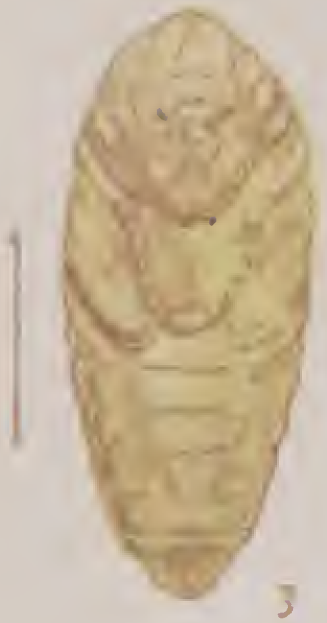

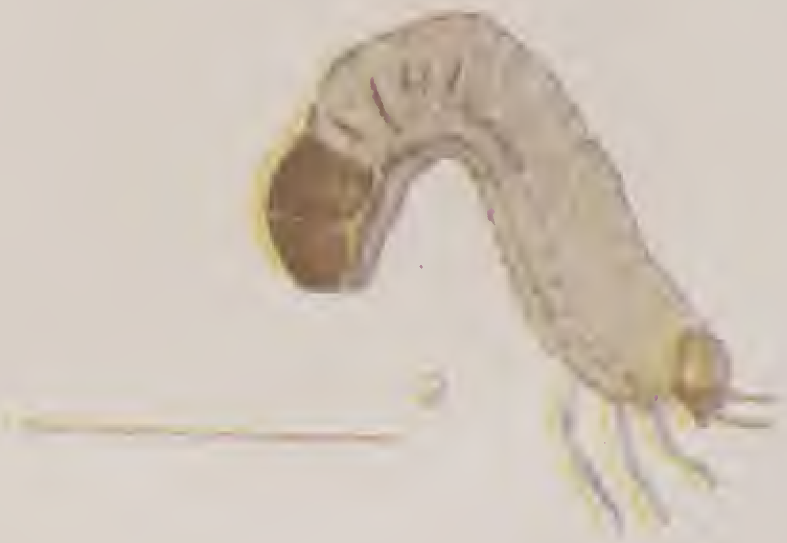

1. **Adult**
2. **Larva**
3. **Pupa**

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